

# MATERIAL SAFETY DATA SHEET

## 1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology  
Standard Reference Materials Program  
100 Bureau Drive, Stop 2320  
Gaithersburg, Maryland 20899-2320

SRM Number: 2260a  
MSDS Number: 2260a  
SRM Name: Aromatic Hydrocarbons in  
Toluene

Date of Issue: 03 December 2004

MSDS Coordinator: Mario Cellarosi  
Telephone: 301-975-6776  
FAX: 301-926-4751  
E-mail: SRMMSDS@nist.gov

Emergency Telephone ChemTrec:  
1-800-424-9300 (North America)  
+1-703-527-3887 (International)

**Description:** Standard Reference Material (SRM) 2260a is a solution of 36 aromatic hydrocarbons, primarily polycyclic aromatic hydrocarbons (PAHs)<sup>1</sup> ranging in molecular mass from 128 amu to 302 amu in toluene. Each unit of SRM 2260a consists of a five 2-milliliter ampoules, each containing approximately 1.2 mL of solution.

**Substance:** Toluene

**Other Designations:** **Toluene** (methylbenzene; 1-methylbenzene; methylbenzol; toluol; methyl benzene; toluene)

<sup>1</sup> The total concentration of the PAHs in this material is less than 0.1 %, which is below the reportable limit (0.1 % for chemicals identified as carcinogens) required by OSHA according to 29 CFR 1910.1200 (g)(2)(i)(C)(1) for individual MSDS information. For the list and actual concentration of these compounds, refer to the corresponding Certificate of Analysis.

## 2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

<b>Component:</b>	<b>Toluene</b>
<b>CAS Number:</b>	108-88-3
<b>EC Number (EINECS):</b>	203-625-9
<b>SRM Nominal Concentration (mass %):</b>	> 99
<b>EC Classification:</b>	F, Xn
<b>EC Risk (R No.):</b>	11, 20
<b>EC Safety (S No.):</b>	2, 16, 25, 29, 33

## 3. HAZARDS IDENTIFICATION

**NFPA Ratings (Scale 0–4):** Health = 2      Fire = 3      Reactivity = 0

**Major Health Hazards:** Respiratory tract, skin and eye irritation. Aspiration hazard. Central nervous system depression. Nerve damage.

**Physical Hazards:** Flammable liquid and vapor. Vapor may cause a flash fire.

**Potential Health Effects**

**Inhalation:** Inhalation (acute exposure) of toluene with exposure to 100 ppm may cause irritation; 200 ppm to 600 ppm, up to 8 hours caused fatigue, confusion, headache, nausea, dizziness, and impaired coordination. Exposure to 800 ppm caused immediate irritation, nasal mucous secretion, metallic taste, drowsiness, and impaired balance. Prolonged exposure may cause mucous membrane irritation, vomiting, insomnia, nosebleeds, chest pains, euphoria, headache, nausea, loss of coordination, impaired speech, vision, and or hearing, and abnormal bleeding.

<b>Skin Contact:</b>	Skin contact with toluene may cause irritation. Vapors may cause skin to dry. Prolonged or repeated contact may cause dermatitis from defatting of the skin.		
<b>Eye Contact:</b>	Eye contact with toluene may cause irritation and corneal burns if not promptly removed. Concentration around 300 ppm to 800 ppm may cause irritation and lacrimation.		
<b>Ingestion:</b>	Aspiration of toluene into the lungs causes lung damage and may be fatal. The approximate lethal dose in humans is 15 mL to 30 mL.		
<b>Listed as a Carcinogen/ Potential Carcinogen:</b>	Yes	No	
	_____	<u>X</u>	In the National Toxicology Program (NTP) Report on Carcinogens.
	_____	<u>X</u>	In the International Agency for Research on Cancer (IARC) Monographs.
	_____	<u>X</u>	By the Occupational Safety and Health Administration (OSHA).

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#### 4. FIRST AID MEASURES

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<b>Inhalation:</b>	If adverse effects occur, remove to uncontaminated area. Give artificial respiration, if not breathing, by qualified personnel. Get immediate medical attention.
<b>Skin Contact:</b>	Rinse affected area with copious amounts of water for at least 15 minutes while removing contaminated clothing. Get medical attention, if needed.
<b>Eye Contact:</b>	Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Get immediate medical attention.
<b>Ingestion:</b>	Get immediate medical attention. <b>DO NOT</b> induce vomiting. If vomiting occurs, keep head lower than hips to prevent aspiration. Give artificial respiration, if not breathing, by qualified personnel.

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#### 5. FIRE FIGHTING MEASURES

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<b>Fire and Explosion Hazards:</b>	Toluene is a severe fire hazard. Vapors, which are heavier than air, may ignite from distant ignition sources. Flash backs may occur. Flow or agitation of toluene may generate electrostatic discharges, which may ignite or explode.
<b>Extinguishing Media:</b>	Regular dry chemical. Carbon dioxide. Water. Regular foam.
<b>Fire Fighting:</b>	Move container from fire area if it can be done without risk. Use water spray to cool containers until well after the fire is out and to discharge vapors. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).
<b>Flash Point (°C):</b>	4 (39 °F)
<b>Method Used:</b>	Closed cup.
<b>Autoignition Temp. (°C):</b>	480 (896 °F)
<b>Flammability Class (OSHA):</b>	IB
<b>Flammability Limits in Air</b>	
<b>UPPER (Volume %):</b>	1.2
<b>LOWER (Volume %):</b>	7.1

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#### 6. ACCIDENTAL RELEASE MEASURES

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<b>Occupational Release:</b>	Avoid flames, sparks, and other sources of ignition. Reduce vapors with water spray. Collect small spilled material after absorbing with sand or other non-combustible material in an appropriate container for disposal. For large spills, stop leak if possible without personal risk. Remove sources of ignition. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to the Release Quantity (RQ).
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**Reportable Quantity:** Toluene is subject to reportable quantities (RQ) under Title III of SARA, which is greater than the unit quantity provided for SRM 2260a. See Section 15, "Regulatory Information".

**Disposal:** Refer to Section 13, "Disposal Considerations".

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## 7. HANDLING AND STORAGE

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**Storage:** Store and handle in accordance with all current regulations and standards. Store in a tightly closed container. Keep separated from incompatible substances. Refer to SRM 2260a Certificate of Analysis for storage of SRM 2260a.

**Safe Handling Precautions:** See Section 8, "Exposure Controls and Personal Protection".

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## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

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**Exposure Limits:** **Toluene**

OSHA (PEL): 100 ppm TWA  
OSHA (PEL): 300 ppm Ceiling  
NIOSH: 375 mg/m<sup>3</sup> (10 h) recommended TWA (100 ppm)  
NIOSH: 560 mg/m<sup>3</sup> recommended STEL (150 ppm)  
OES UK: 191 mg/m<sup>3</sup> TWA (skin) (50 ppm)  
OES UK: 574 mg/m<sup>3</sup> STEL (skin) (150 ppm)

**Ventilation:** Use local exhaust ventilation system. Ensure compliance with applicable exposure limits. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present.

**Respirator:** If necessary, refer to the "NIOSH Guide to the Selection and Use of Particulate Respirators Certified under 42 CFR 84" for selection and use of respirators with organic vapor cartridges certified by NIOSH.

**Eye Protection:** Wear safety goggles. **DO NOT** wear contact lenses in the laboratory. An eye wash station should be readily available near areas of use.

**Personal Protection:** Wear appropriate protective clothing and chemically resistant gloves to prevent skin exposure.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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**Component:** **Toluene**

**Appearance and Odor:** Clear liquid. Colorless. Distinct odor.

**Relative Molecular Weight:** 92.14 g/mol

**Molecular Formula:** C<sub>6</sub>H<sub>5</sub>CH<sub>3</sub>

**Boiling Point:** 111 °C (232 °F)

**Freezing Point:** -95 °C (-139 °F)

**Volatility:** 100 %

**Density:** 0.8669 g/cm<sup>3</sup>

**Water Solubility:** 0.05 % @ 20 °C

**Solvent Solubility:** Soluble in alcohol, ether, benzene, chloroform, ligroin, acetic acid, carbon disulfide, and acetone.

**Odor Threshold:** 10 ppm to 15 ppm

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## 10. STABILITY AND REACTIVITY

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**Stability:**   X   Stable        Unstable

Stable at normal temperatures and pressure.

**Conditions to Avoid:** Avoid heat, flames, sparks, and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

<b>Incompatible Materials:</b>	Halogens, combustible materials, acids, oxidizing materials, and metal salts.
<b>Fire/Explosion Information:</b>	See Section 5, "Fire Fighting Measures".
<b>Hazardous Decomposition:</b>	Oxides of carbon and hydrocarbons.
<b>Hazardous Polymerization:</b>	<u>      </u> Will Occur <u>  X  </u> Will Not Occur

## 11. TOXICOLOGICAL INFORMATION

<b>Route of Entry:</b>	<u>  X  </u> Inhalation <u>  X  </u> Skin <u>  X  </u> Ingestion
<b>Toxicity Data:</b>	Man, Oral LD <sub>LO</sub> : 719 µL/kg Man, Inhalation TC <sub>LO</sub> : 100 ppm Rat, Oral LD <sub>50</sub> : 636 mg/kg Human, Inhalation TC <sub>LO</sub> : 825 mg/m <sup>3</sup> /6 h Human, Inhalation TC <sub>LO</sub> : 750 mg/m <sup>3</sup> /8 h
<b>Health Effects (Acute and Chronic):</b>	See Section 3: "Hazards Identification" for potential health effects.

## 12. ECOLOGICAL INFORMATION

<b>Ecotoxicity Data</b>	
<b>Fish Toxicity:</b>	Coho, silver salmon ( <i>Oncorhynchus kisutch</i> ) LC <sub>50</sub> (mortality): 8110 µg/L (96 h)
<b>Invertebrate Toxicity:</b>	Water flea ( <i>Daphnia magna</i> ) EC <sub>50</sub> (immobilization): 6000 µg/L (48 h)
<b>Algal Toxicity:</b>	Green algae ( <i>Selenastrum capricornutum</i> ) EC <sub>50</sub> (growth): 9400 µg/L (8 h)
<b>Environmental Summary:</b>	Not expected to leach through the soil or the sediment. Accumulates very little in the bodies of living organisms. Highly volatile from water.

## 13. DISPOSAL CONSIDERATIONS

<b>Waste Disposal:</b>	Dispose in accordance with all applicable federal, state, and local regulations. Subject to disposal regulations, U.S. EPA 40 CFR 262, Hazardous Waste Number U220.
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## 14. TRANSPORTATION INFORMATION

<b>U.S. DOT and IATA:</b>	Toluene; UN1294; Hazard Class 3; Packing Group II.
<b>Canadian Transportation of Dangerous Goods:</b>	Toluene; UN1294; Class 3; Packing Group/Risk Group II.
<b>Land Transport ADR and RID:</b>	Toluene; UN1294; Class 3, Classification Code F1; Packing Group II.
<b>Maritime Transport:</b>	Toluene; UN1294; Class/Division 3; Packing Group II.

## 15. REGULATORY INFORMATION

<b>U.S. Regulations:</b>	CERCLA Sections 102a/103 (40 CFR 302.4): Toluene: 453.6 kg (1000 lbs). SARA Title III Section 302 (40 CFR 355.30): Not regulated. SARA Title III Section 304 (40 CFR 355.40): Not regulated. SARA Title III Section 313 (40 CFR 372.65): Toluene. OSHA Process Safety (29 CFR 1910.119): Not regulated. SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21): ACUTE: Yes. CHRONIC: Yes. FIRE: Yes. REACTIVE: No. SUDDEN RELEASE: No.
<b>State Regulations:</b>	California Proposition 65: Toluene is known to cause developmental toxicity.

**CANADIAN Regulations****WHMIS Classification:** Not determined.**EUROPEAN Regulations****EC Classification (assigned):**F Highly Flammable.  
Xn Harmful.**EC Risk Phrases:**R11 Highly flammable.  
R20 Harmful by inhalation.**EC Safety Phrases:**S2 Keep out of reach of children.  
S16 Keep away from sources of ignition. No smoking.  
S25 Avoid contact with eyes.  
S29 Do **NOT** empty into drains.  
S33 Take precautionary measures against static discharges.**Concentration Limits:**Concentration > or = 12.5 %:  
Xn Harmful  
R20 Harmful by inhalation.**National Inventory Status****U.S. Inventory (TSCA):** Listed on inventory.**TSCA 12(b)****Export Notification:** Not listed.

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**16. OTHER INFORMATION**

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**Sources:** MDL Information Systems, Inc., MSDS *Toluene*, 16 September 2004.

**Disclaimer:** Physical and chemical data contained in this MSDS are provided only for use as a guide in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.